BDTIC 4CH BUILDING DIGITAL TWIN International Congress

"Digital Twins Longevity Assurance"

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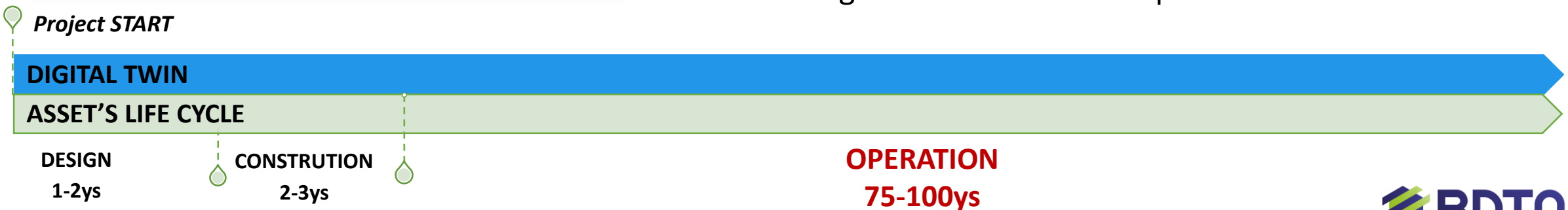
In today's digital age, digital twins have become essential tools for managing and optimizing physical assets throughout their lifecycle.

However, ensuring that these digital twins have the same longevity as the assets they represent poses technological, information governance, and software development challenges.

In this presentation, we will explore key solutions to ensure that digital twins can accompany their physical assets throughout their entire lifespan.



BDTA BUILDING DIGITAL TWIN ASSOCIATION

Challenges in long-term Digital Twins

Closed Data Formats

Difficult long-term interoperability and risk information obsolescence if developers stop support.

Dependency on Proprietary Protocols

Makes them susceptible to changes or the discontinuation of the original providers, potentially leading to expensive reconfigurations or even data loss.

Short Lifecycle of Software Solutions

Contrasts with the long lifespan of many physical assets, posing a challenge to maintaining digital twins over time.

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Solutions for long-term Digital Twins

Open Data Formats

Open, standardized data formats ensure digital twins' interoperability and longevity, enabling diverse tool access over time.

Open Protocols

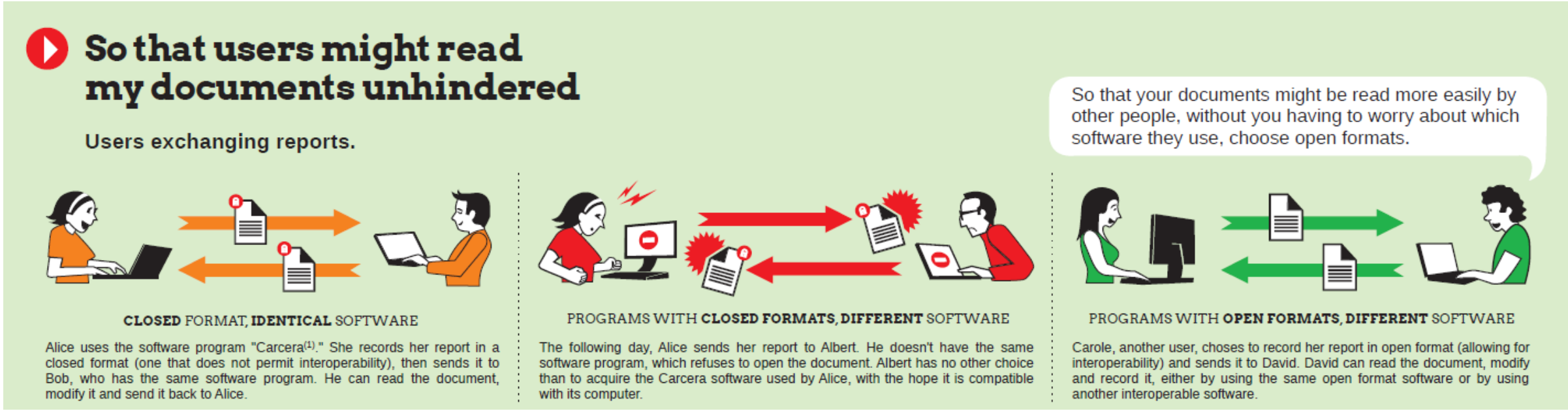
Using standard protocols allows digital twins to integrate with various systems, reducing vendor dependence.

Open Software

Open-source software, maintained by a developer community, effectively extends system lifespan and ensures continuity, even without original developer support.

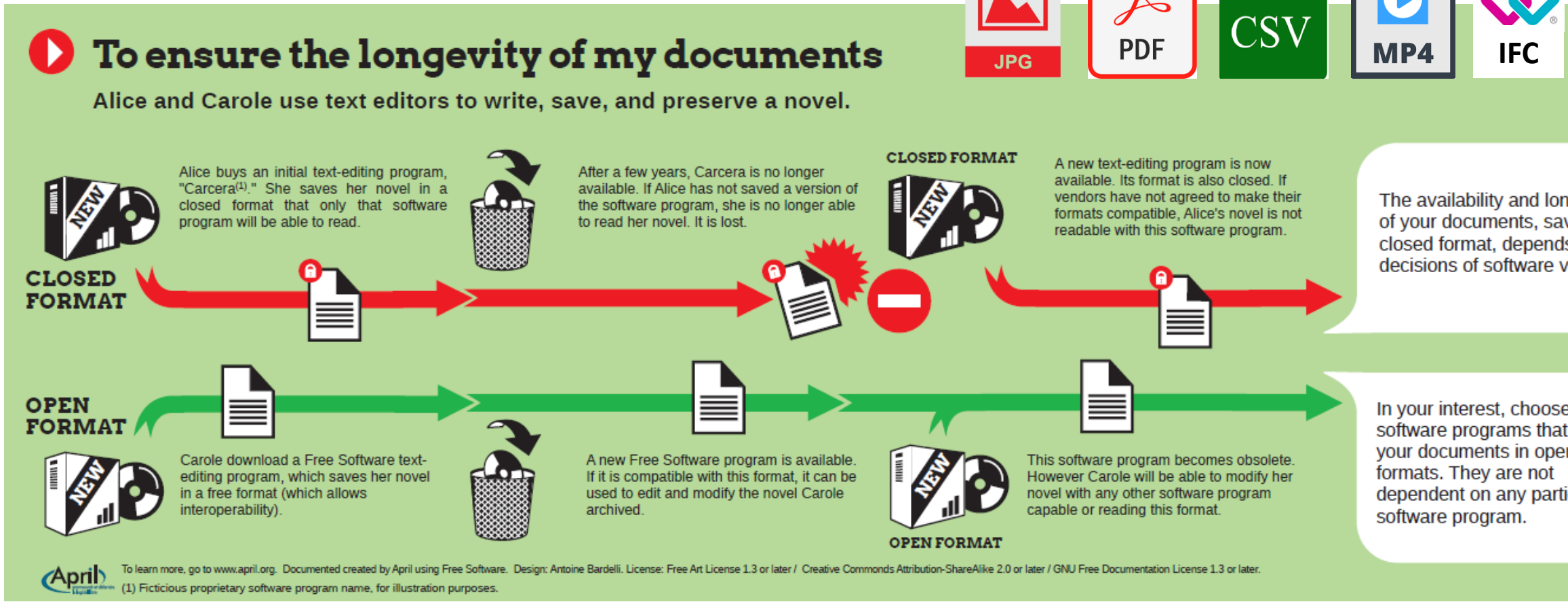
Open Data Formats

An open file format is a file format for storing digital data defined by an openly published specification usually maintained by a standards organization, and which can be used and implemented by anyone. An open file format is licensed with an open license.



https://www.april.org/en/open-formats

Open Data Formats



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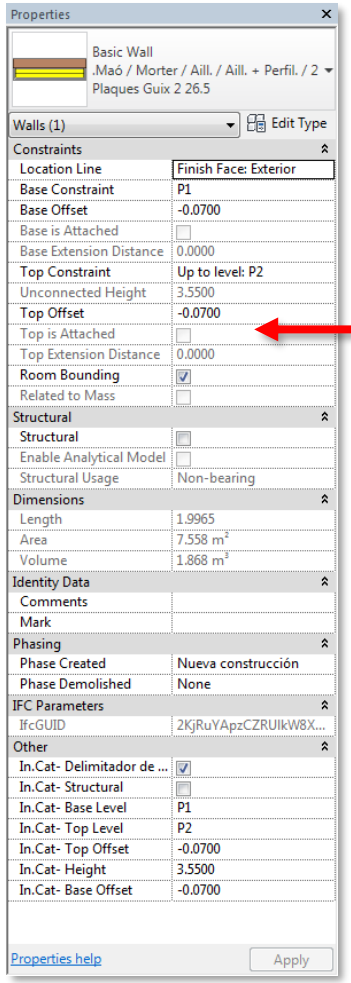
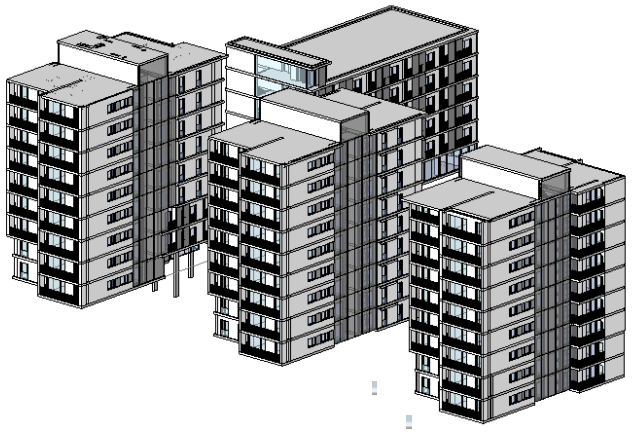
Open Data Formats





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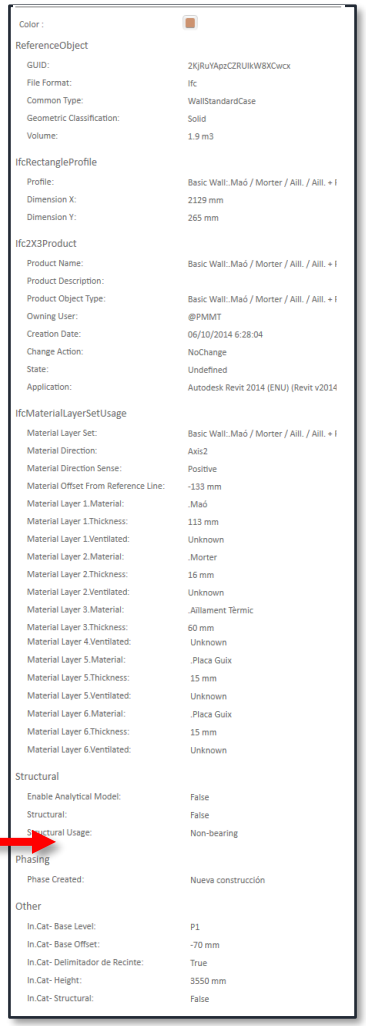

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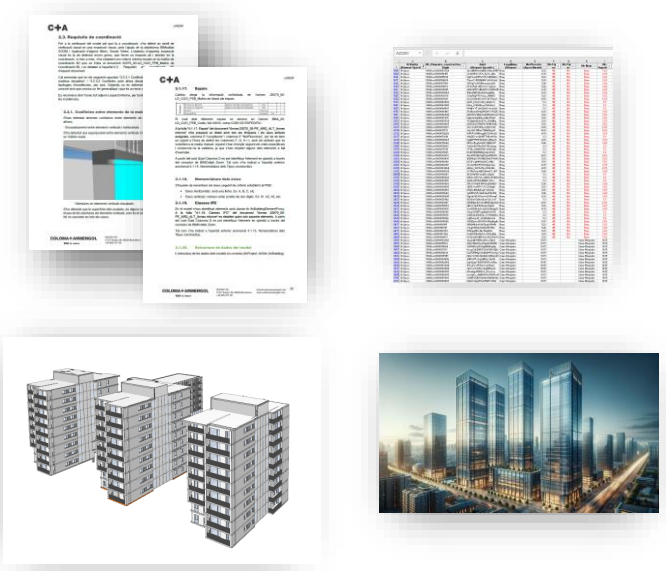
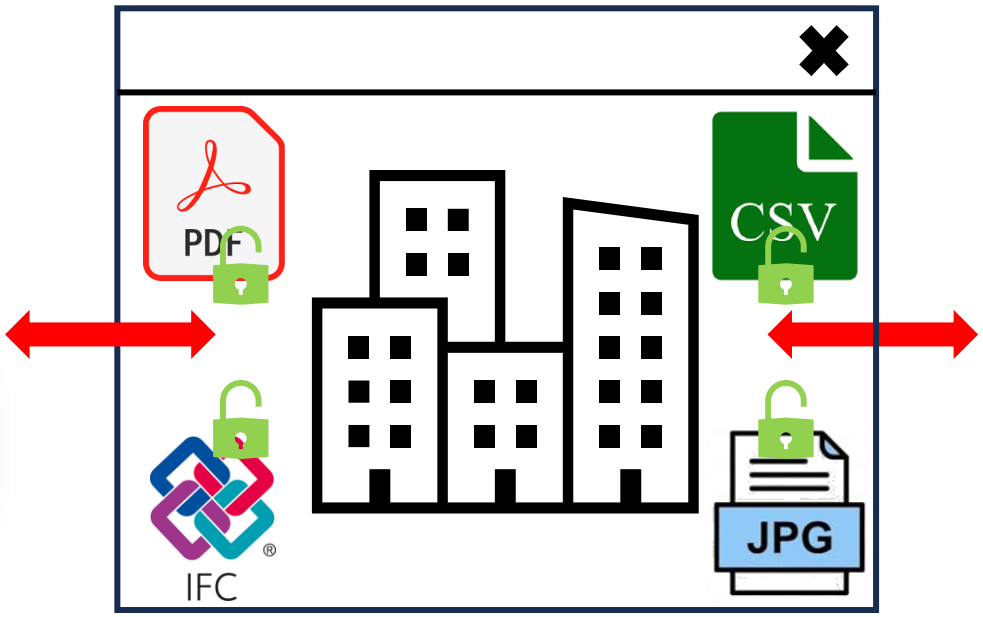
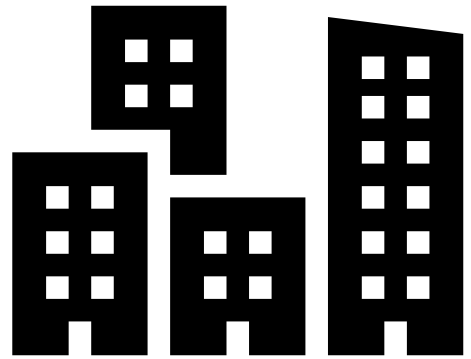
Open Data Formats

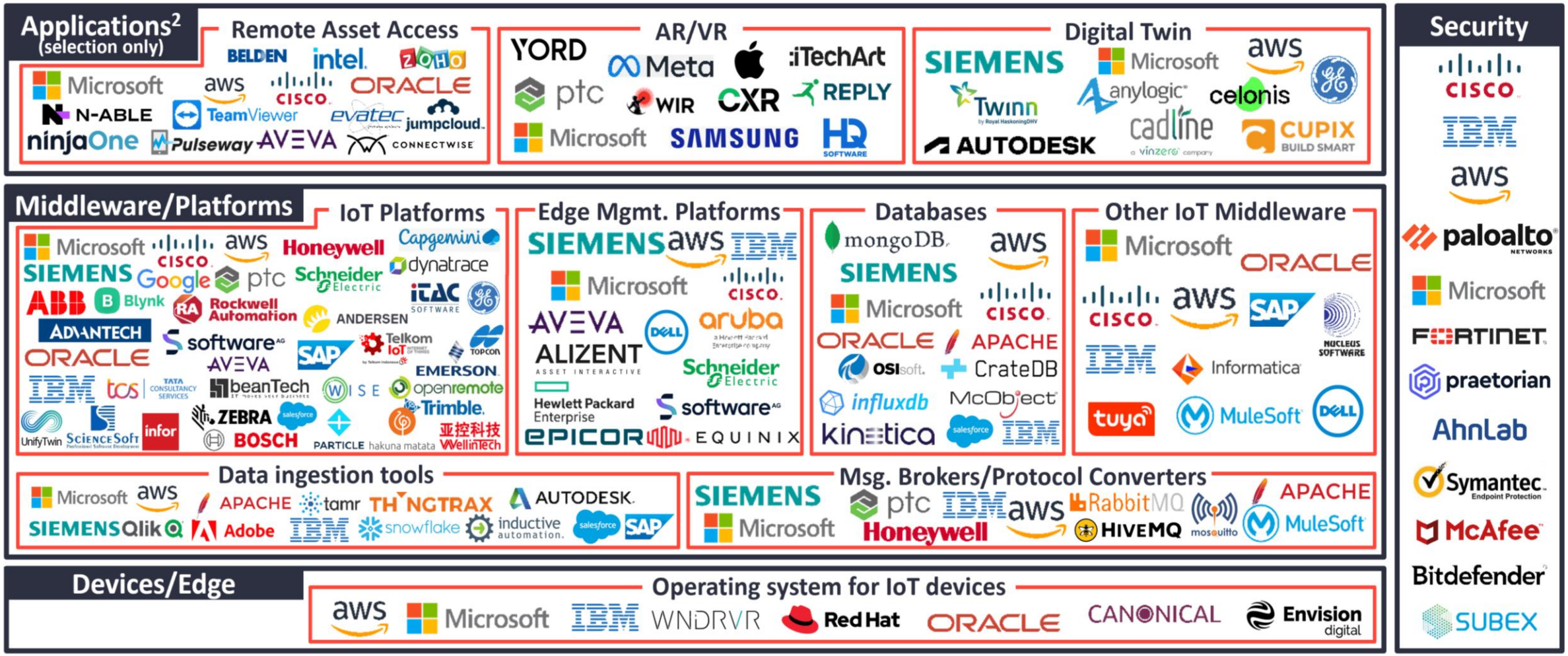






Open Protocols

IoT Software Companies in 2023



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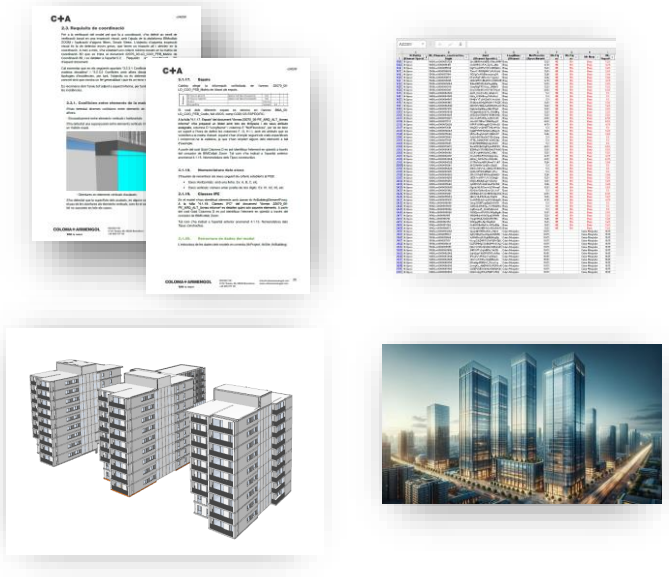
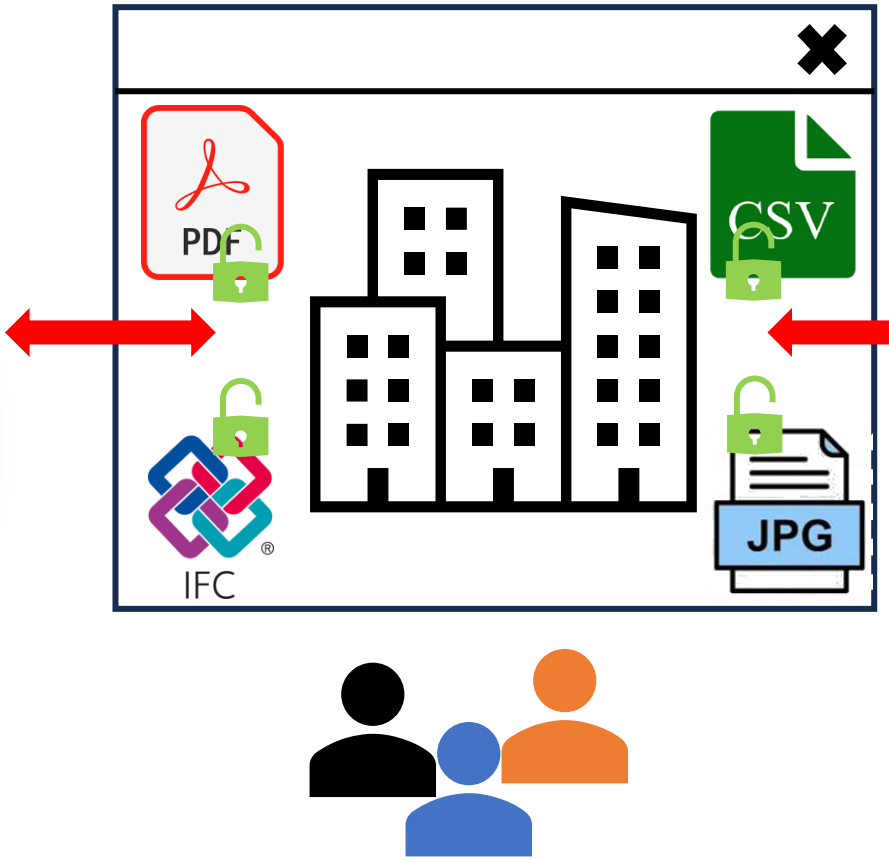
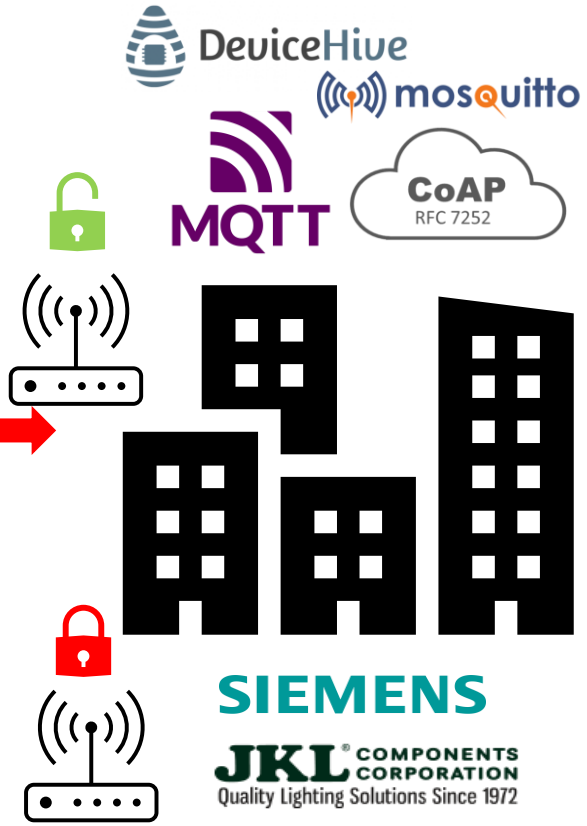
Open Protocols







Open Software

Software whose source code and other rights are published under an open license. Users can use, change and redistribute the software to anyone, for any purpose.

UNIX 1969

Not "open source" but it's the first experience of shared code

Richard Stallman 1983

Sets the modern bases of open source with the GNU project.

BSD 1989

386BSD, 1st fully free version of BSD

Red Hat 1993

1st big comercial succes of open source

Open Source Intiative Mozilla 1998

The definition of open source is adopted. Appears open source web browser.

Java 2007

Sun Microsystems releases the Java Development Kit as OpenJDK

GitLab is born! 2014

Kubernetes

Microsoft buys GitHub 2018

Fosters globat collaboration among developers.

Usenet 1980

Free Software Foundation 1985

Linus Torvald announces the creation of a free OS kernel

Linux 1991

Most used open souce database solution

My SQL and HTTP Apache 1995

Becomes the most widely used Linux.

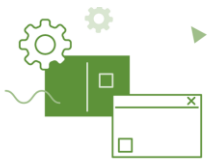
Ubuntu 2004

US Court stablishes that open-source code can be protected under copyright laws.

Git 2008

Stats open sourcing projects such as .NET Framework

Git 2015



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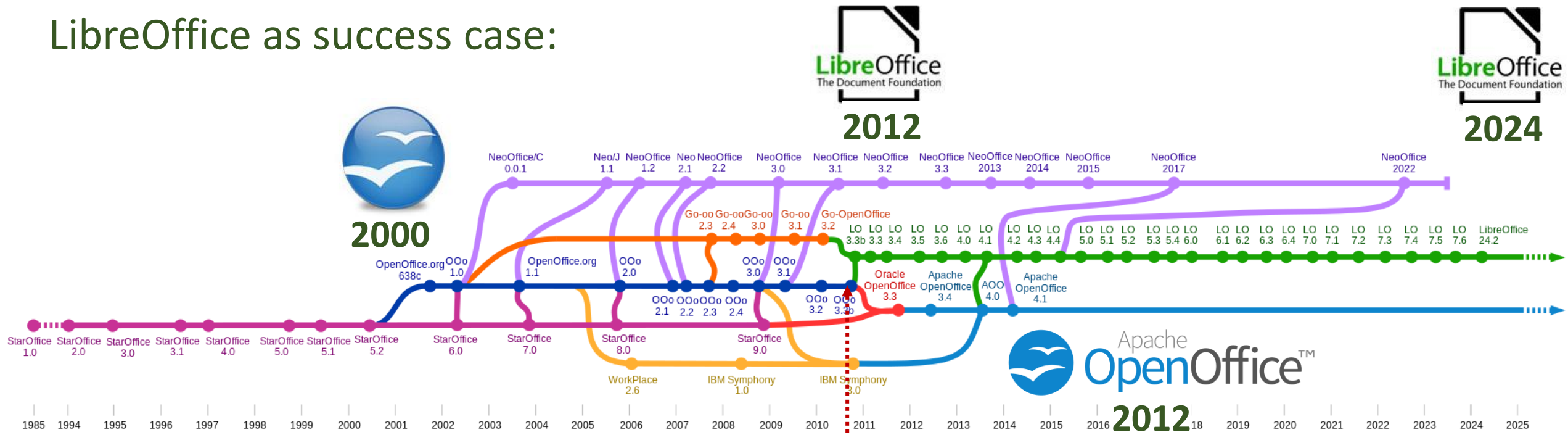
Open Software

LibreOffice as success case:



StarOffice™

1992

2010

Oracle buys Sun Microsystems.
Then developers take the code and creates LibreOffice

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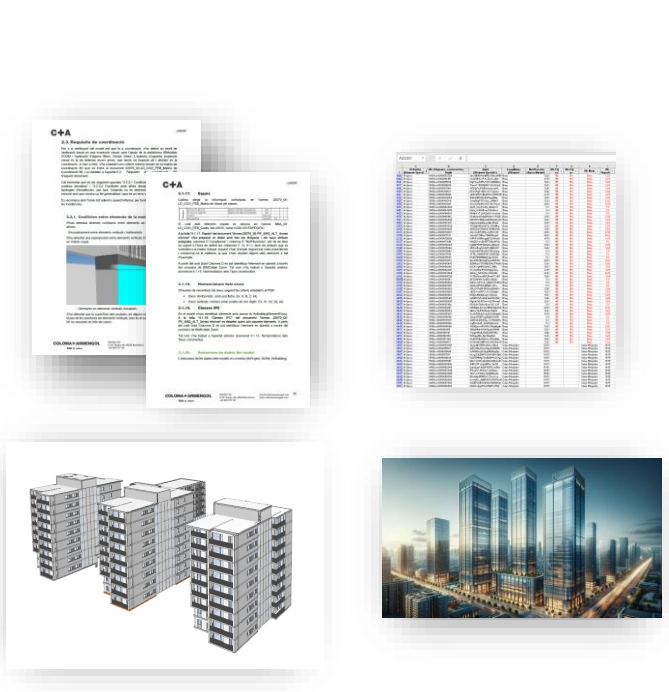
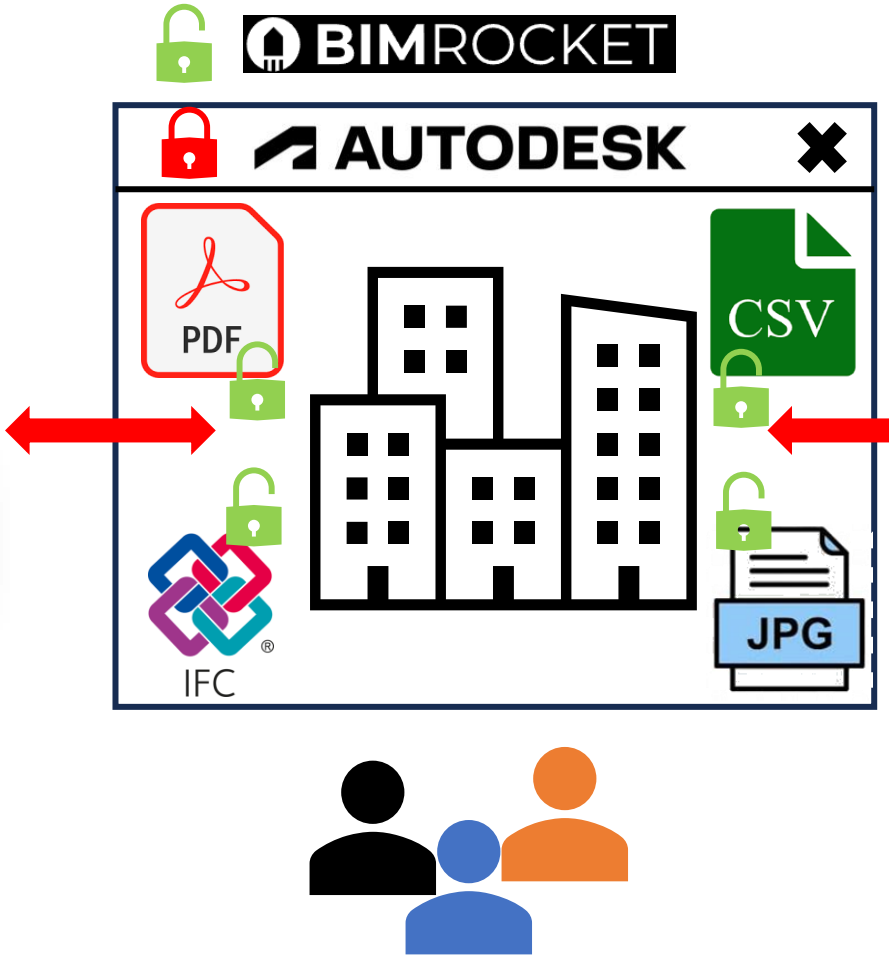
Open Software





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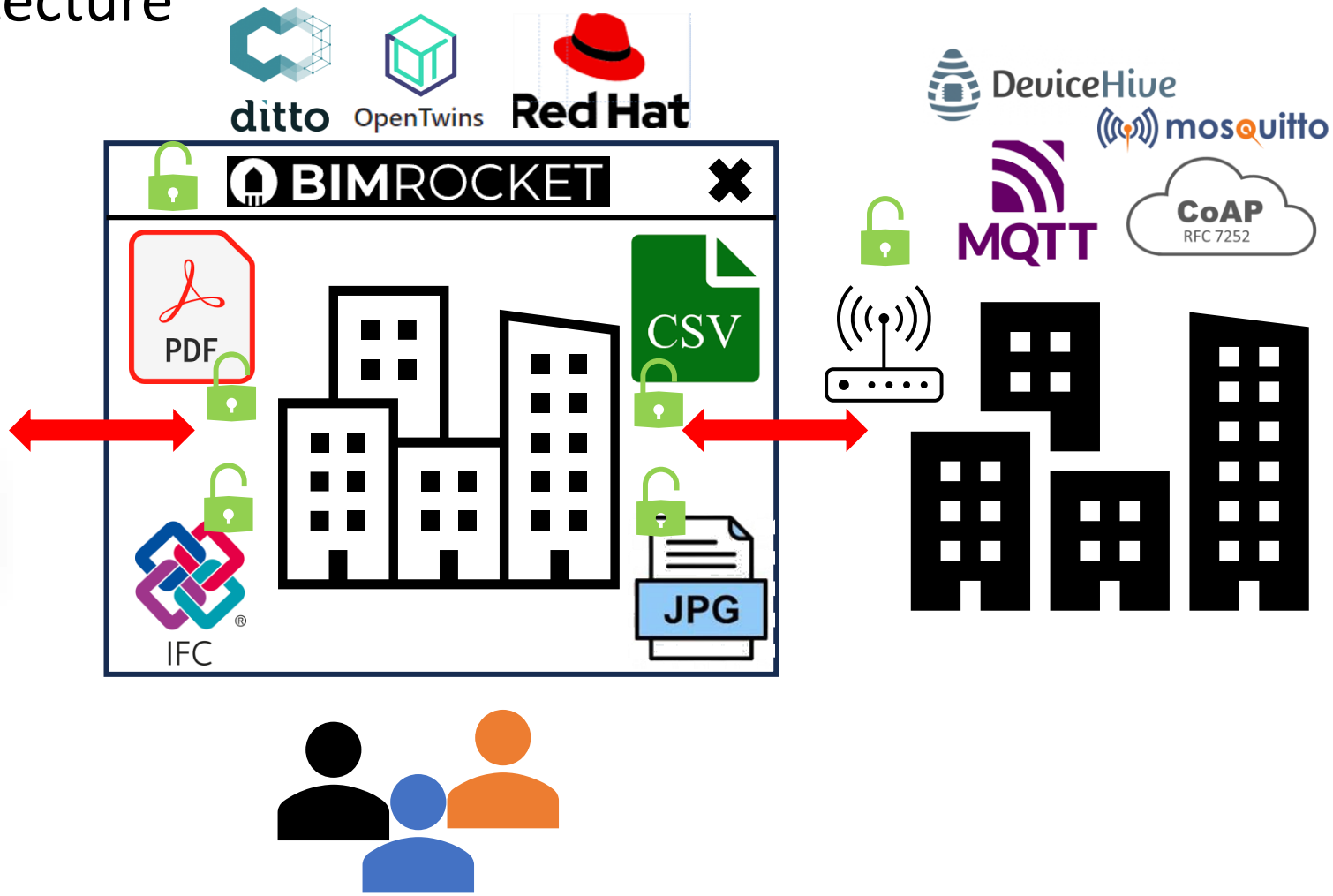
Open Digital Twins architecture



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Long-term Digital Twins strategy

Use Open Formats

Utilize standardized and interoperable data formats, such as IFC, FBX, and glTF, to store and share information of digital twins. This ensures that the **information can be accessed and processed by various tools over time**.

Use Standard Protocols

Adopt open communication protocols, such as OPC UA, MQTT, and BACnet, for integrating sensors, actuators, and other devices connected to digital twins. **This avoids dependence on proprietary solutions**.

Use Open-Source Software

Develop and utilize digital twin platforms based on open-source software, such as FreeCAD, BlenderBIM, or BIM Rocket. This ensures continuity and long-term support, even if the original developers discontinue maintenance. **Open-Source software assures the use of real standards.**

Benefits of the Open Digital Twins

Cost Reduction

Open Digital twins optimizes software maintenance and operation costs of physical assets throughout their lifecycle.

Improved Efficiency

Open Digital twins allows availability of up-to-date and accurate software and contributes to more efficient asset and process management.

Enhanced Collaboration

Open Digital Twins encourages collaboration among different software developers and main stakeholders.

Enhanced Security

Open Digital Twins Increases security Because all the community can examine the code. This empowerment helps prevent hidden vulnerabilities and backdoors.

Improved Reliability

Open Digital Twins increases code reliability by allowing improvements driven by one developer to be leveraged by the entire community.

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Examples of long-term IT platforms in other sectors

Web Servers

In the world of information technology, web server software like Apache and Nginx have proven to maintain their functionality and relevance for decades, thanks to the adoption of open standards and community development.

Banking Systems

The computer systems that support banking operations are often designed to function for decades, with gradual updates and improvements. This is achieved through the use of open standards and robust information governance.

Aerospace Systems

In the aerospace sector, aircraft control and monitoring systems are designed to operate throughout the lifespan of the aircraft, using robust communication standards and data formats.

Railway Systems

Railway control and signaling systems are also characterized by their longevity, as they must operate reliably for decades. This is achieved through the adoption of sector-specific protocols and standards.

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